

desirable interest in science and philosophy. The contents include lectures on evolution and the physical basis of life, and essays on aspects of agnosticism and ecclesiasticism which may lead incipient rationalists to firm ideas "on the nature, the duties and the non-insoluble problems of human life."

A COPY of Hazell's Annual for 1902, edited by Mr. W. Palmer, was received a few days ago from the publishers, Messrs. Hazell, Watson and Viney, Ltd. The annual is so well known and widely used that little need be said as to the character of the contents. Certainly no better epitome of the subjects which attracted general attention during last year is available; and no manual can be better depended upon to give concise and accurate information concerning public men and affairs and national interests. Among the subjects of new articles in the present edition we notice anthropology, archaeology, astronomy, biology, chemistry, electricity, geography, geology, meteorological office, motor vehicles, photography, telephones and universal time. Under each of these headings a short account is given of progress made during last year. These summaries are naturally of very little value to the student of science, but they serve to give general readers a view of some of the results attained. Under biology, less than a dozen subjects are mentioned—all of them zoological—and there is no reference to botany either under this heading or elsewhere in the book. Other subjects we miss are physics, metallography (to which a paragraph might well have been devoted), radiations from radium and similar substances, malaria and mosquitoes. In the list of educational associations we find the usual secondary school organisations, but not the Association of Technical Institutions, to which practically all the principals of our technical school belong.

THE overproduction of alcohol, a consequence of the overproduction of sugar, has led to many attempts to increase its use for purposes of lighting and heating. In contrast to the repressive action of our own authorities in this matter, the strangling action of which in our chemical industries is well known, M. Jean Dupuy, the French Minister of Agriculture, organised a conference in December last to discuss the best means of extending the use of denatured alcohol for lighting and heating. The current number of the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale* contains a report of this conference by M. Lindet, and gives a complete account of the numerous forms of alcohol burners which have been devised both for lighting and heating. In conclusion, M. Lindet discusses the question as to the cost of heating and lighting by alcohol in comparison with the methods in current use, and especially with reference to petroleum, and points out that although petroleum has a slight advantage in the matter of cost, this is more than counterbalanced for domestic purposes by the cleanliness and freedom from smell of the alcohol.

THE same number of the *Bulletin* contains an interesting review, by M. Ach. Livache, of the methods in use for the destruction or utilisation of town refuse. The processes in use fall mostly under two types, incineration, which has been chiefly developed in this country, and treatment by reduction, in which either a solvent or superheated steam is used. The latter is mostly in favour in the United States. The relative advantages of the two methods are critically examined, it being pointed out that no hard and fast rule can be laid down which will be applicable to all cases, a careful examination and analysis of the refuse which it is proposed to treat being an indispensable preliminary.

THE additions to the Zoological Society's Gardens during the past week include a Green Monkey (*Cercopithecus callitrichus*) from West Africa, presented by Mrs. A. Clayton; a Common

Otter (*Lutra vulgaris*) British, presented by Mr. W. H. Radcliffe Saunders; a Naked-footed Owllet (*Athene noctua*) European, presented by Mrs. Tewson; a Larger Hill Mynah (*Gracula intermedia*) from Northern India, presented by Miss F. V. Cooper; a Mute Swan (*Cygnus olor*) European, presented by Mr. R. S. Lindley; a South African Ground Hornbill (*Bucorvus cafer*) from Zululand, presented by Major C. H. Rowley, D.S.O.; three Lions (*Felis leo*) from South-west Africa; a Malayan Bear (*Ursus malayanus*) from Malacca; a Bennett's Cassowary (*Casuarus bennetti*) from New Britain, deposited; two Common Rheas (*Rhea americana*) from South America; a Scemmerring's Pheasant (*Phasianus scemmerringi*) from Japan; twelve Goldeneyes (*Clangula glaucion*) European, purchased.

OUR ASTRONOMICAL COLUMN.

NEBULA AROUND NOVA PERSEI.—A circular from the Centralstelle at Kiel announces the receipt of an interesting communication from Prof. Max Wolf concerning the changes in the nebulous surroundings of Nova Persei. On March 5 he obtained a fine photograph with an exposure of four hours, which showed that all the former condensations had become weaker. From the Nova towards the south-west there now extends a new long zone of nebulosity much brighter than the previously existing condensations. Indeed on February 3, the date of the last previous photograph, this region was very bright. It is extremely interesting that this later nebulosity is brighter than the appearance of August, 1901. The same circular also announces a communication from the Lick Observatory stating that from recent photographs with the Crossley reflector Perrine finds no evidence of polarisation in condensations A and D of the Nova Persei nebula.

NEW VARIABLE STAR, 3, 1902 (MONOCEROTIS).—Prof. W. Ceraski, of Moscow, announces the variability of the star B.D. + 6° 1462,

$$\left. \begin{array}{l} \text{R.A.} = 6\text{h. } 50\text{m. } 37\text{s. } 4 \\ \text{Decl.} = + 6^{\circ} 21' 4 \end{array} \right\} (1855^{\circ} 0).$$

The star was near maximum about February 20, being then about 7.0 mag. The determination was photographic, but there is not sufficient data yet available to calculate the period. The magnitude in the B.D. is 8.0 (*Astronomische Nachrichten*, Bd. 158, No. 3775).

SEISMOLOGY IN AUSTRIA.

AT the present time the shelves of libraries throughout the world are bending beneath volumes of statistics, the analysis of which it is hoped will lead to the discovery of something new. To these piles of undigested materials, if we surmise correctly, there is shortly to be added an inundation of statistics from those who study earthquakes. Twenty years ago, seismologists were few and far between, but now they have increased in number and are represented by organised societies, which publish journals and reports. The first of these had its origin in Japan. Fifteen years later a corresponding body appeared in Italy, following on the heels of which came commissions and committees with similar objects in various European countries. Even the time-honoured routine of many meteorological and magnetical observatories has not been allowed to rest in peace, and the daily round at these establishments includes a visit to the seismographs.

As illustrative of these new departures, we call attention to what is being done by the Royal Academy of Sciences in Vienna. In 1895 this body established a Commission for the Observation of Earthquakes, the reports of which were published in the Academy's *Transactions*. Possibly on account of their size they are now issued as separate numbers, twenty-one of which form the first series. Of the second series six parts have been issued, a brief notice of which will give an idea of the extensive and valuable investigations now being carried out in Austria.

The key to this work is found in part ii. of the series, which its author, Dr. E. v. Mojsisovics, describes as a general report of shocks recorded in Austria in the year 1900. From this

we learn that the number of earthquakes was 169 as against 190 noted in 1899 and 209 noted in 1898. To obtain these records the empire has been divided into sixteen districts, each district having its referee. Dalmatia, for example, has 423 observers, who send their observations—unfortunately for the editor—in at least three different languages, to Prof. A. Belar in Laibach.

There are five horizontal pendulum stations, four of which receive from the Government a yearly subvention of 1000 to 1100 K. A sixth station is to be installed at Pribram, one instrument to be on the surface and another at a depth of 1100 m. in the Adalbert-Schacht.

In part i. Dr. W. Láská gives a catalogue of records obtained between June 1899 and December 1900 from a three-component seismograph installed at Lemberg. From the introduction to this work it is clear that Dr. Láská has met with troubles, some of which might certainly have been avoided had he been acquainted with the experiences of his predecessors. On the second page we learn that the clock employed to drive the record-receiving photographic film has also been employed to give time marks on the same. To expect a time-piece to unroll a heavy band of paper or to turn a drum and at the same time to keep a chronometer-like rate is a false economy in which those who construct seismographs for the first time frequently indulge. Whatever inaccuracies may, in consequence of this apparent simplicity of arrangement, have crept into Dr. Láská's time determinations it was evidently his intention that what could be measured should be measured with unimpeachable exactitude. The writer has in his possession a globe which, as it could not be made in England, was purchased from abroad. Its scale is stated to be 1/25,823,716·814. Although Dr. Láská does not aim at such exactitude, he tells us that the mirror of his N.W. pendulum is 3·757 m. distant from the recording drum, whilst the period of the pendulum when hung vertically is 0^s·31515, to which, however, he adds that there is no certainty about the accuracy of the fourth decimal. Tables which inform us that 0·1 minute = 6 seconds, 0·2 minute = 12 seconds, &c., also convey an idea of unnecessary redundancy.

In the working of the instrument, which is installed in a cellar, a well-known bogie has been encountered. There is hardly a seismologist who has not met it, and volumes sufficiently numerous to form a moderate library have been published describing its behaviour. It is a something which causes pendulums to move fitfully, and many observers cling to the belief that it is an actual motion of the ground and either trace the same to the beating of waves on a distant shore or to some other cause. The photograms showing these movements which Dr. Láská reproduces are strikingly like those obtained from observatories all over the world. Forasmuch as a copious ventilation or the burning of a gas jet in the room thus haunted frequently results in expelling the intruders, my own opinion is that the majority of them have their origin in the movements of the atmosphere in the room rather than the movement of the ground.

To show that there may be a relationship between seismic disturbances and the movements of magnetic needles which is not mechanical, our attention is once more drawn to the ancient story of the magnet at Parc St. Maur which at the time of an earthquake was caused to move whilst a similarly formed and similarly suspended copper bar remained at rest. Our attention, however, is not drawn to the possibility that these two systems had very different natural periods of vibration.

In a supplement, suggestions are made respecting the determination of the distance of an earthquake origin from a given station from the interval which elapses at that station between the arrival of the preliminary tremors and the large waves. In recent reports issued by the British Association, especially that for 1900, it will be seen that not only have these suggestions already assumed a practical form, but also that other subjects referred to by Dr. Láská have received greater or less consideration.

Part iii. is a detailed account of earthquakes noted in German Bohemia by Dr. V. Uhlir.

In part iv. Prof. P. Franz Schwab gives the records obtained from an "Ehlert" pendulum installed at Kremsmünster. From an analysis of the records it appears that the frequency of earthquakes was much less between Apogee and Perigee than between Perigee and Apogee. In the cooler months, especially from the middle of September to the beginning of March, the pendulums were frequently unsteady. The greatest disturb-

ances, however, accompanied marked barometric depressions. These movements probably eclipsed movements due to earthquakes.

The next number, by Dr. E. Mazelle, is a register of 146 records obtained from a Reubeur-Ehlert pendulum at Trieste.

One excellent suggestion made by Dr. Mazelle is that seismologists should have a uniform system in chronicling their observations.

The periods of his pendulums are taken monthly and are recorded to within 1/100 of a second of time, whilst a table is given to compute possible tiltings of the pendulum to within 1/1000 of a second of arc.

At the end of this paper we find certain analyses of the registers, relating, for example, to the monthly frequency and the frequency of disturbances of different amplitudes, those with amplitudes between 1 and 2 mm. forming 35 per cent. of the total observations.

The sixth part of these publications, by J. N. Woldrich, refers to the earthquake which on January 10, 1901, shook north-east Bohemia. Here and there we find reference to unusual phenomena like the swaying of forests as if moved by a strong wind, the increase or decrease of water in springs, and the effect of the movements upon men and the lower animals. The latter, excepting the story of a man who by the shaking was caused to walk in his sleep, are of the usual type.

Most of these papers are accompanied by maps or diagrams.
J. M.

SCIENTIFIC SERIAL.

THE February number of the *Journal of Botany* contains three articles dealing with mosses. The first and most interesting paper records the finding of an Arctic species, *Tetraplodon Wormskjoldii*—practically a *Splachnum*—on Widdy Bank Fell, by Messrs. E. C. Horrell and D. A. Jones. Its usual habitat is about 70° N., and further north.—Mr. Duncan discusses the occurrence of *Octodiceras Julianum* along with *Fontinalis* in the River Severn.—There is the first part of a joint paper by Messrs. D. Prain and E. Baker on *Indigofera* species, in which it is proposed to deal with the numerous synonyms.—Mr. C. B. Clarke writes an appreciative article on Colonel Sir Henry Collett, who combined botany with various important administrative posts in India.

IN the number for March, Messrs. S. Schönland and E. G. Baker conclude a series of articles on South African species of *Cotyledon*.—Two sets of "Notes" deal with the distribution of plants. The first, by C. E. Salmon, enumerates floral localities in Norfolk, thereby furnishing an appendix to Trimmer's "Norfolk Flora" and the supplement thereto.—The second article, written by William Whitwell, relates to East Sussex. He alludes to the "Notes" given by Salmon in the last December number of this journal, which were more copious and referred to the whole county. These two papers, with Arnold's well-known book, should bring the Sussex flora up to date, more especially since Mr. Salmon benefited by help from Mr. Botting Hemsley and by records due to Mr. Roper.—In the supplement, Mr. Batters once again essays a catalogue of British marine Algae, which will be very cordially welcomed. The "revised list" was published in the *Annals of Botany*, 1890, by the same writer in conjunction with Mr. Holmes. As regards localities a change will be noticed; instead of the arbitrary sections of the coast given in the revised list, specific towns, &c., are now mentioned. Practically the whole of this part deals with the Myxophyceæ, or, as they are generally termed, the Cyanophyceæ.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, March 14.—Mr. S. Lupton, vice-president, in the chair.—A paper on the thermal expansion of porcelain was read by Mr. A. E. Tutton. The paper gives an account of experiments made to determine the expansion of Bayeux porcelain between 0° and 120° C. The material employed was a portion of the tube used by Bedford in his experiments on the expansion of porcelain between 0° and 830° C. Another piece of the same tube has also been used by Chappuis in a series of determinations by the Fizeau method between 0° and 83° C. The author has worked with an interference dilatometer, which possesses advantages over the Abbe